Signs and Symptoms of Low Potassium

Potassium is essential for several homeostatic and cellular processes. As a result, low levels of this mineral hamper normal kidney functions and neuromuscular activities. The current article describes more about the signs and symptoms of low potassium levels in the body.

Potassium or Kalium (K) is present as potassium chloride (KCl) and potassium ions (K+) in the cells and fluids of our body. The total potassium content of a healthy individual is 50 mEq (milliequivalent) per kg of body weight. 98% of this potassium is present inside the cells, whereas only 2% is present in the interstitial fluid, and in blood at a concentration of 3.5 to 5.0 mEq/L.

Decrease in the potassium level of blood (hypokalemia) may occur due to abnormal distribution of potassium in the body. It may also be the result of increased excretion of potassium through urine, potassium deficiency, vomiting and diarrhea, or even a side effect of certain medications including diuretics, chemotherapeutic drugs, etc.

Hypokalemia influences the ratio of intracellular to extracellular potassium, which affects several cellular processes.

The effects of such an imbalance are seen through muscle weakness, cardiac problems as well as abnormal neuromuscular functions. Severe hypokalemia is characterized by a drop in potassium levels below 2.5 mEq/L, and needs immediate medical attention. Given below is a detailed account of the signs and symptoms of low blood potassium.

Mild Hypokalemia

The signs and symptoms experienced due to moderately low levels of potassium (generally between 2.5 to 3.5 mEq/L) are as follows:
- Fatigue
- Muscle pain (myalgia)
- Cramps
- Nausea
- Constipation
- Dizziness
- Depression
- Mood swings
- Slow reflexes

**Severe Hypokalemia**

Potassium content below 2.5 mEq/L results in muscle malfunction giving rise to the following physiological effects.

► **Skeletal Muscle Malfunction**

Low level of potassium influences the contractions of skeletal muscles. It also reduces the blood supply to muscles which may lead to the breakdown of muscle fibers (rhabdomyolysis). The symptoms include:

- Fatigue
- Severe myalgia
- Muscle stiffness
- Joint pain (occasionally)

► **Gastric Problems**

Bowel motility or intestinal peristalsis is reduced leading to paralytic ileus characterized by a partial or complete blockage of the intestine. These effects are manifested as:

- Nausea
- Anorexia
- Bloating
- Diarrhea
- Constipation
- Abdominal cramps
- Abdominal fullness

► **Altered Renal Function**

Potassium depletion leads to increased thirst along with resistance to anti-diuretic hormone (ADH), which is responsible for maintaining the concentration of urine. Increased thirst and altered kidney functions lead to an increase in the production of dilute urine.

Also, under normal conditions, the reabsorption of sodium ions occurs in exchange for potassium ions. But in response to the low levels of potassium, such reabsorption occurs in exchange for hydrogen ions. This leads to metabolic alkalosis characterized by an increase in sodium bicarbonate content of blood. These effects can be observed as:

- Increased thirst
- Frequent urination (polyuria)
- Breathing problems
• Cyanosis
• High blood pressure
• High blood pH
• Increased levels of ammonia in urine
• Increased level of sodium bicarbonate in blood

► Abnormal Cardiac Function
Under hypokalemic conditions, the electrical conduction system of the heart gets disturbed leading to abnormal and premature contractions. This leads to irregular or ectopic heartbeats. The signs and symptoms observed in these cases are:

• Anxiety
• Palpitations
• Weakness
• Chest pain
• Abnormal ECG

ECG of a hypokalemic individual typically reveals:

• Prominent U waves
• Flattened or inverted T waves
• ST depression
• Longer PR interval

► Liver Damage
The increased production of ammonia (by kidneys) affects the normal liver function of converting ammonia to urea. This causes hepatic encephalopathy, wherein excessive amounts of ammonia accumulate in blood. This alters brain function leading to:

• Poor concentration
• Poor judgment
• Confusion
• Disorientation
• Slurred speech
• Seizures

Potassium regulates the neuromuscular activity of the skeletal, cardiac and other smooth muscles. However, the appropriate amount of this predominantly intracellular mineral, and its correct distribution is crucial for maintaining the electrolyte balance of the body.